Chapter 15. Travel Cost Method of Valuing Environmental Amenities

In earlier chapters we have discussed approaches to environmental valuation that directly construct markets (contingent valuation or voting) or indirectly reveal values via observed willingness-to-pay for related goods (e.g. SSD or hedonics). The travel cost method is another indirect measure that is useful in certain circumstances, but which has flaws from both an economist's and an environmentalist's perspective.

The central theoretical flaw in the travel cost method, in common with SSD and hedonics, is that it can only capture use values, shedding no light on non-use values which could be much larger, at least in principle. Moreover, there are two additional flaws that are likely to result in overstatement of use value, further distorting resource allocation against non-use (or passive) outcomes. Other flaws will be discussed in closing.

The travel cost method is typically used to value sites that are used for recreation, though it can be used for any "destination" that is visited as an amenity. The method can assign values (including consumer surplus, not just marginal willingness-to-pay) to be placed on the elimination of a site or the creation of a new site. In some applications it can also be used to value a change in the environmental quality at a recreational site.

How does the travel cost method work? The fundamental idea is that the number of trips a household makes to a recreational site in a given time period is analogous to the number of pounds of broccoli purchased in a given time period. Just as the number of pounds of broccoli purchased will increase at a lower price and decrease at a higher price, the number of trips to the recreational area will increase if it has a lower price.

But, what is the "price" paid for a recreational site? The price is the time and travel cost expenses (along with any entry fee) that are incurred during a visit to the recreational site. If people travel a long distance to get to the site (facing a high price) they would be expected to take fewer trips per year to the site than those living nearby (facing a low price).[1] Suppose, for example, that gasoline is $3.00/gallon and an individual earns a wage of $20/hour at work (after taxes).[2] If gas mileage is 25 miles to the gallon–at an assumed average speed of 50 miles per hour–and if the individual lives 50 miles away from the recreational site, the cost of the round trip to the site is $12.00 (four gallons of gas) plus $40.00 (two hours of time) or $52.00. Suppose such an individual takes two trips a year to the recreational site.

Another individual, facing the same price for gas and average speed to the site, might have a lower wage of $15/hour and might live 25 miles from the recreational site. For this individual, the price of a round trip to the recreational site is $ $6.00 (two gallons of gas) plus $15.00 (one hour of time) or $21.00. This individual would be expected, other things equal, to take more frequent trips to the recreational site, say five trips per year.

A recreational site will have many such individual visitors, the two above being depicted on the overall demand curve for trips to the site shown in Figure 15.1.[3] What is the "value" of this recreational site? The value, as always, is the area under the demand curve in the figure. As

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[1]One difficulty with the travel cost method that differs from the broccoli analogy is that those households with very high values for the recreational site can *lower the price they pay for it* by moving closer to the recreational site. This option is not available for broccoli lovers who must face the same price as those who just "sort of like" broccoli. We shall return to implications of this potential problem in closing.

[2]In principle, we want to measure the true opportunity cost of all resources expended during a trip to the recreational site. Ideally, we would know the mileage each visitor's car gets, the depreciation of the car associated with the trip, and their after-tax wage rate. However, the after-tax wage rate is a lower bound estimate of the time cost, since it assumes that people would have chosen to work if they did not take the trip when they might have chosen to do something else, despite having the option to work. Additionally, salaried individuals also complicate the analysis, with their implicit after-tax wage rate (after tax income divided by the number of hours worked) typically taken as a reasonable proxy for the opportunity cost of time. Some salaried individuals would rather work less (have a higher value of leisure time, hence higher travel cost) while others would rather work more (have a lower value of leisure time, hence lower travel cost).

[3]If there is an entrance fee, say $10, some visitors in Figure 15.1–those with costs of getting to the site of less than $10–will forego some of the trips they would have otherwise taken.

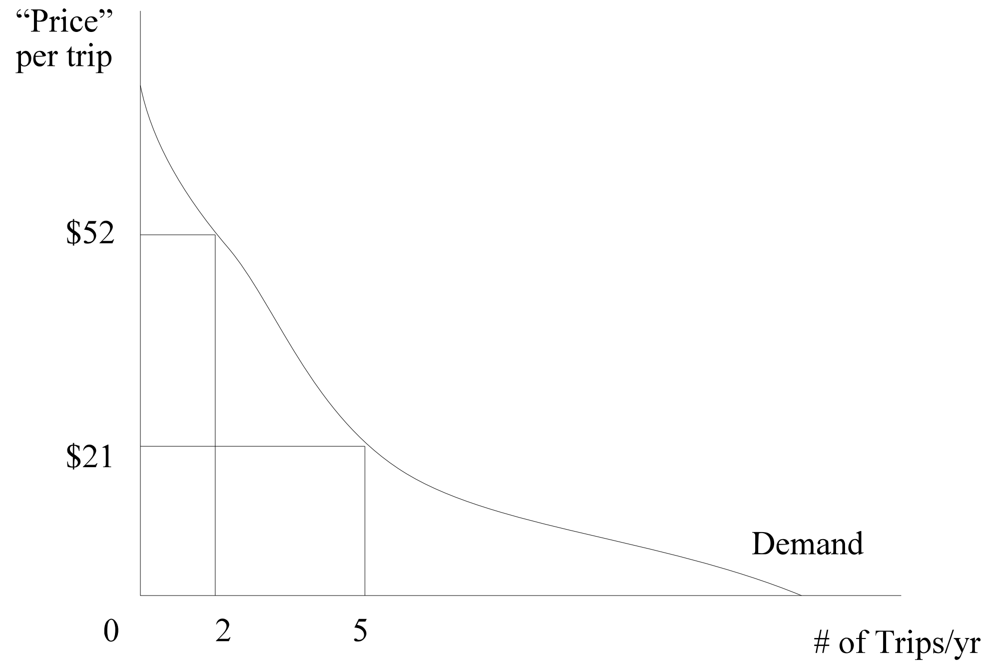

Figure 15.1 Valuing a recreational site by the travel cost method

an illustration of how this information might be used in a practical policy setting, suppose that this recreational area is being considered for elimination, to be replaced by a shooting range for a local gun club. The shooting range will, itself, have alternative locations that could be selected. Suppose that the net value of having the shooting range at the location of the recreational site, versus some alternative location, is $10,000. If the area under the demand curve of Figure 15.1 exceeds $10,000 the location is more valuable left as a recreational area than converted into a shooting range, and conversely.[4]

The travel cost method is simple, not terribly controversial, and has a great deal of appeal to many people, since it is based on actual behavior. Moreover, this method can often be

[4]Sometimes it is very easy to make decisions with this method. For example, damming up Hell Canyon (the deepest canyon in North America) to create hydro power was estimated to have economic cost savings over alternative locations of $80,000. Even a very low cost and imprecise travel cost survey revealed recreational benefits, that would be lost if the hydro power were pursued, of around $900,000. In public hearings, it was pointed out that even very large errors in the benefit analysis would not alter the conclusion not to built the hydro power plant, and that plant was never built, with Congress prohibiting further development of Hell Canyon.

conducted at fairly low cost, with the necessary information readily available through surveys of visitors.[5] Simple zones (perhaps defined by zipcodes of visitors), at varying distances from the recreation site can be created and merged with information collected from visitors about the number of visits they make (trips "purchased") and which zone they live in (different "prices"). Or, one could use an individual travel cost approach, using more detailed surveys of the actual travel costs of those visiting the recreational site under consideration.[6] Such analyses should hold constant socio-demographic variables such as age, income, gender, and education levels (either individually or by zone) to obtain true estimates of the impact of price on the quantity of trips.

There are, however, a number of caveats to bear in mind when using the travel cost method. It assumes that individuals respond to changes in explicit travel costs (e.g. $.35 per mile) as they do to implicit travel costs (time), and also just as they would to changes in admission price (indeed, the three categories are all lumped together).

A more important limitation is that the method assumes that a trip is "single purpose." This is often not the case. For example, virtually anyone who visits Devil's Tower in northeastern Wyoming would also visit Mount Rushmore in the nearby Black Hills of South Dakota. It is difficult to apportion the cost of the whole trip to the sub-component sites. Yet failing to do so (attributing the cost of the whole trip to, say, Devil's Tower) will overstate the value of a single site, perhaps by a great deal.

Similarly, suppose people enjoy travel itself, liking the feeling of being "out on the road."

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[5]As with the survey methods discussed earlier, there are inevitably issues of survey design, selectivity bias, and so on. Moreover, there are data/statistical issues surrounding the estimation of the demand curve for the recreational site that are common to all derivations of market demand curves.

[6]While beyond the scope of the present treatment, more complicated so-called "random utility" approaches can be used, employing survey and other data in more elaborate statistical analyses.

In this case the traveler is obtaining those "pure travel" benefits along with those of the recreational site This would also result in the over-valuation of the recreational site in question.

As discussed in the first footnote of this chapter, those who value certain sites may choose to live nearby. Essentially, those that have high values are "choosing" a lower price per trip, something that cannot be done with ordinary private goods. Such people will have low travel costs but high values for the site that are not fully picked up by this method, although the low travel costs will themselves encourage greater trip frequency.[7]

However, the biggest single problem, from an environmentalist's perspective, with the travel cost method is that it cannot be used to measure non-use values. Employing data from actual users ignores the values that individuals might have for the option to use, as well as bequest values (that might relate to either use or preservation), along with the "passive" preservation values that could be of great importance in particular settings.

The implications of this discussion for policy are complex. Some recreational or environmental sites will have little in the way of non-use value associated with them (e.g. a recreational fishing site with little in the way of unique features). The decision to allow a water irrigation project to use the water might be well evaluated using the travel cost method of calculating benefits to compare to the foregone benefits of the irrigation water. But, other decisions might involve rare and pristine natural environments (e.g. a decision to allow noisy and polluting snowmobiles in Yellowstone Park, or overnight camping in wilderness areas). For the latter, it is likely that non-use values will be important. Decisions ignoring those non-use values, particularly if the use values are overestimated for some of the reasons discussed here, might

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[7] It is possible that nearness to the recreation site might cause property values to be higher or wages to be lower, as discussed in the previous chapter. In this eventuality, one could add what is paid in land and labor markets to what is paid in travel costs expended to get to the site to obtain a more accurate estimates of the "full" value of the site.

readily lead to resource misallocation inefficiently harming the environment.

Questions for Discussion:

1) Why is the travel cost method only appropriate for valuing use values?

2) Do you think that it is appropriate to treat all categories of cost (explicit out of pocket travel costs, implicit time costs, and entry fee, if applicable) as "dollar-equivalent," or do some categories *mean* more to travelers than others?

3) Some of the concerns associated with the travel cost method would lead to expectations of overvaluation of a site, while others would result in undervaluation. What do you think is the net direction of likely bias?

4) How is trip-taking to a recreational site like the purchase of an ordinary good, say broccoli? How does it differ?